Mould Detector
IoT - Black mould prevention system

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Project Background and description:

In Ireland, Black Mould is very common and poses a major health problem: some black moulds have been shown to be linked to serious health issues such as immune system disorders and asthma attacks. Black mould is caused by dampness and humidity, along with warm temperatures. Ireland has prime conditions for black mould growth. Black mould thrives on damp, dark, warm areas. During winter months condensation can form in poorly ventilated areas where people sleep, shower, or cook. It is extremely stubborn and difficult to remove. Many supermarkets bleach-based mould killers are simply not up to the task. Once it grows, it tends to keep recurring again and again. *The best way in any case is to prevent the problem before it starts*:

This project presents a novel IoT-based solution for early detection and prevention of the growth of black mould in the home.

Proposed Implementation:

This will be achieved by using an Arduino MKRWiFi1010 in the IoTCarrier board equipped with sensors for monitoring the local air temperature, humidity, air quality and moisture at the surface of the wall to monitor, track and analyse conditions in your home for black mould growth.

The Arduino will be connected to a Raspberry Pi *via* serial USB connection over which sensor data will be sent to the Pi. If needs be, the raw data can be processed locally on the Pi with a Python script. A web server (Node.js) hosted on the Pi will make these data available through a REST API, which will be viewed accessed on a web dashboard, with member login (built using a JavaScript framework such as Express).

Analytics on all the sensor data (temperature, humidity, moisture, light intensity and local air quality) will be graphically displayed on the dashboard. When conditions become favourable for black mould growth (e.g. temperature > 18 ℃, humidity > 70% RH, moist surface, dark), the user will receive a notification to open windows, switch on dehumidifiers *via* email/social media. This can be done using MQTT broker with a ThingSpeak React/IFTTT Webhooks.

A user can activate fan/dehumidifier (simulated in packet tracer) using a HTTP request through the API.

Tools, Technologies and Equipment:

1. Arduino MKRWIFI1010 with IoT carrier
2. Arduino IDE
3. Onboard Environmental sensors: temperature, humidity, RGB light sensor, IAQ sensor.
4. Grove capacitive moisture sensor
5. Arduino display (optional)
6. C++
7. Raspberry Pi
8. Python
9. Node.js (Web Server)
10. JavaScript/Express
11. ThingSpeak
12. IFTTT/Webhooks
13. Packet Tracer

This is an ambitious project but many of the implementations here are achievable. There is also ample potential for future expansion/future releases with ideas for more advanced features (if time allows!).

Project Repository

https://github.com/CormacC30/compsys-iot-project